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Growing

CRIMSON

CLOVER

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GROWING CRIMSON CLOVER

Information for this leaflet was furnished by Plant Science Research Division and Soil and Water Research Division, Agricultural Research Service.

Crimson clover¹ is the most important winter annual legume for the South.

Besides being an excellent pasture and hay crop, crimson clover covers the soil and protects it against washing and leaching during the fall, winter, and spring. It may be turned under for green manure in the spring. It produces large quantities of seed, which can be easily harvested and sown without the use of expensive machinery.

DESCRIPTION

The common name of this clover refers to the bright crimson color of the blossoms. German clover and scarlet clover are other common names frequently used. The leaves and stems resemble those of red clover, but are distinguished by the rounded tips of the leaves (see fig. 1) and by the fact that both leaves and stems have more hair.

When crimson clover is planted in the fall, the leaves develop from the crown and form a rosette, which enlarges whenever weather conditions are favorable.

In the spring, flower stems develop rapidly and end in long pointed flower heads.

The plant sets seed in late spring

and dies as the seed matures. Seeds are yellow, about twice as large as red clover seeds, and more rounded.

ADAPTATION

Crimson clover does well in the cool, humid weather that occurs in most of the South in winter.

Crimson clover may be grown as a summer annual in northern Maine, northern Michigan, and other locations where the weather remains cool and moist. The crop thrives on both sandy and clay soils and is tolerant of ordinary soil acidity. It does not thrive on heavy, poorly drained soils that remain wet and cold during the winter months. On very poor soils, stands are difficult to obtain and the growth is stunted.

In the northernmost part of the region where crimson clover is grown as a winter annual (see fig. 2) it is important to seed the crop not later than late August. Otherwise, in areas such as Kentucky, southern Missouri, and southern Ohio, the plants may not become well enough established to survive the winter. It is also important, in these northerly areas, to plant the crop in fertile soil and to grow adapted varieties.

¹ *Trifolium incarnatum*.

VARIETIES

Before World War II, all crimson clover was of the common type, and more than half of the seed used in the United States was imported. Reseeding types were not developed until the late 1930's. More than half of the domestic seed produced now is of the reseeding type.

The term "reseeding" designates a type that produces good volunteer stands in the fall from seed shattered the previous spring. Fall volunteer stands are made possible by a hard seed coat that delays germination from late spring, when the seed shatters, until fall. Common crimson clover is not a reseeding type.

Five named varieties of the reseeding type are widely used. These are: Dixie, Auburn, Autauga, Chief, and Talladega. There are other reseeding strains less widely used. Dixie, Auburn, and Autauga are early varieties—their seed matures about a week earlier than seed of Chief and Talladega. They are also earlier than the common type.

The early varieties make slightly more growth during the winter than the late varieties; the late varieties make more of their growth in the spring and can be grazed longer in the spring. Dixie appears to be the most winter hardy crimson clover in the upper part of the South.

A soft-seeded crimson clover variety named Frontier was released in 1962 by the Mississippi Agricultural Experiment Station



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Figure 1.—Flower head and leaflets of crimson clover.

in cooperation with the Crops Research Division, USDA; likewise, a reseeding variety named Tibbee was released in 1970. Frontier and Tibbee have the following characteristics: Large seed size, superior seedling vigor, greater fall and winter growth, equal or superior forage and seed yields, and early maturity. The new varieties were derived from a plant introduction received from Italy in 1956 (PI-233812).

Seeds of reseeding varieties cannot be distinguished from each other or from seeds of the common type—use certified seed to insure trueness to variety and performance.

INOCULATION

If you are going to plant crimson clover where it has not been grown before, inoculate the seed before planting. If plants are not inoculated, they will develop slowly, become yellow and die. Inoculated plants are able to obtain about two-thirds of their nitrogen from the air through their root nodules.

Even if crimson clover has been grown before, inoculation may be necessary to get good stands. For example, if crimson clover is grown in a crop rotation that includes a row crop, the sun will heat and dry the soil between rows, and this heating and drying may kill the bacteria that form root nodules. There is less danger of bacteria being killed in soils that are shaded during the hottest part of the year.

Commercial bacteria cultures for inoculating seed are available from seed dealers. Directions for using them are given on the label of each container. Scattering soil from a field where inoculated crimson clover has grown is not a recommended method of inoculation; it may cause weed infestation and spread disease.

A supplemental inoculation — applied to the soil — is recommended if weather is hot and dry for several days after inoculated seed is sown. Make the supplemental inoculation by mixing commercial culture with sand or cottonseed meal, and broadcasting the mixture over the soil surface during cloudy, rainy weather as the

young seedlings are emerging. A bushel-size culture (a package containing enough culture to treat a bushel of seed) mixed with 60 pounds of sand or cottonseed meal is sufficient for an acre if distributed evenly.

SEEDBED PREPARATION

A firm seedbed is best for crimson clover. If the seedbed is loose, roots grow into air pockets between soil particles, dry out, and die.

It is difficult to make an ideal seedbed between rows of cultivated crops. Row crops also shade the clover seedlings and compete for moisture. If the row crop is seeded in wider rows and seeded more thinly than it is normally seeded, the clover will become better established.

When planted between rows of other crops, seed is usually broadcast on the surface of the soil and covered by cultivating or harrowing. However, a method that usually gives more complete stands than broadcasting is to lightly stir the soil surface with a harrow, then drill the seed. Drilling between the rows can be done with a one-horse drill.

Seeding following a grain crop is a surer method of establishing a stand than planting between the rows of cultivated crops, provided the seedbed is well prepared. The first step in preparing a good seedbed is to plow or disk after harvest. When the soil has settled, disk or lightly harrow to kill weed seed-



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Figure 2.—Areas where crimson clover is grown as a winter annual. It is best adapted to the area shown in dots; crosshatching shows areas where the crop is successful, but it is more important in those areas to plant seed of an adapted variety and to use recommended cultural practices.

lings. Finally, firmly pack the soil before the clover is seeded.

In a permanent pasture, prepare for seeding by closely grazing or clipping the grass. Thoroughly disk or burn heavy turf before seeding.

SEEDING

Crimson clover may be seeded alone or in combination with winter grains or ryegrass. Seed may be drilled or broadcast. Drilling gives more uniform stands. Do not plant more than one-half inch deep in clay soil or more than three-fourths inch deep in sandy soil.

Rate and Time of Seeding

Under ordinary conditions 12 to 15 pounds of hulled seed to the acre give good stands. Thick stands

(plants an inch apart) produce much greater fall and winter growth than thin stands.

Crimson clover may be sown from the middle of July until November, the best time depending on the location. Late-seeded crops make less fall growth and winter-kill more readily than early-sown crops. The farther north the crop is planted, the more important early establishment becomes. Seeding either immediately before or after heavy rains increases the chances of a good stand.

Spring planting is not recommended: it usually results in a short, stunted growth followed by poor blooming and low yield.

Companion Crops

When companion crops such as rye, vetch, ryegrass, and fall-sown

grain are seeded with crimson clover, the crimson clover usually is seeded at two-thirds the normal rate and the companion crop at one-third to one-half the normal rate. Crimson clover and the companion crop should be seeded at the same time. If the planting depth recommended for the companion crops is the same as that recommended for crimson clover, both crops may be sown in one operation. Two seeding operations usually will be necessary, however, because the seed of most companion crops must be planted deeper than crimson clover seed.

A mixture that often gives excellent results is 5 pounds of red clover and 10 pounds of crimson clover per acre. The crimson clover is usually predominant in the winter and spring; the red clover continues growing in the summer after crimson clover dies. Varieties of the reseeding type have given good results when planted with Johnsongrass, bermudagrass, and other summer-growing perennial grasses.

FERTILIZING

Soils low in plant nutrients produce poor crimson clover crops. The nutrient requirements should be determined on the basis of a soil test because the need for nutrients varies with soils. Most States have a soil testing laboratory. The recommendations for taking and submitting a soil sample can be obtained from your State agricultural experiment station.

Crimson clover requires phos-

phate and potash fertilizer on most soils. Common rates used on deficient soils are 200 to 400 pounds of 0-20-20 fertilizer per acre.

Sometimes a single large application of phosphate and potash fertilizers is sufficient to produce two crops, but annual fall applications on most soils are recommended to maintain high yields. On some soils the addition of boron may improve growth and increase seed yields.

If you grow crimson clover with summer growing perennial grasses such as bermudagrass or bahiagrass, apply phosphate and potash for the clover in the fall and nitrogen for the grass in the summer in either single or split applications. When high rates of nitrogen are applied, the rate of potash may need to be increased to compensate for the potash removed by high yields of grass.

LIMING

Liming to reduce soil acidity is widely practiced in most of the eastern half of the United States. Soil should be tested to determine the need for lime.

In most sections of the country, several kinds of lime are available. The selection of the liming material generally is based on its availability and its capacity to neutralize soil acidity.

Usually, lime is applied on the soil surface and mixed with the surface layer by plowing or disk-ing. It is generally spread by truck by custom operators during any month of the year.

GRAZING

Crimson clover furnishes an abundance of grazing in the fall and spring. It also furnishes grazing during winter months if it is planted early and if it makes good fall growth. Crimson clover combined with small grains or ryegrass has been widely used for winter grazing.

During cold periods, crimson clover makes little growth. Do not let animals damage the stand by grazing too closely during cold weather. Rotating animals from field to field may make it possible to keep livestock grazing crimson clover throughout the winter. However, if the weather is exceptionally cold, it may be necessary to stop grazing until plants resume their growth.

Animals grazing on crimson clover seldom bloat. However, be sure animals are not hungry the first time they are placed in a field of crimson clover. Bloat is less likely to occur on a mixture of clover and grass or grain than on clover alone.

HARVESTING FOR FEED

The quality of crimson clover hay is highest if the crop is cut at the early bloom stage; the yield is highest if the crop is cut at full bloom. Hay is easily cured either in the swath or in the windrow. Fewer leaves are lost and less bleaching occurs in windrowed hay. Although yields as high as $2\frac{1}{2}$ tons per acre are not uncommon on fertile soil, $1\frac{1}{2}$ to 2 tons is the usual harvest.

Crimson clover may be made into silage by the methods used for other legumes.

GREEN MANURING

Crimson clover is an ideal green-manure crop. For best results, plow it under 2 to 3 weeks before you intend to plant the succeeding crop. This gives enough time for decomposition, which is rapid unless the crop is mature when turned under. Occasionally, in fields in which row crops are to be planted, strips are plowed under for green manure and the row crop is later planted in the plowed strips. Clover between the plowed strips matures. Seed may be harvested by hand from the clover between the row crops, and the remaining stubble may be allowed to mat and serve as a mulch. Or, the crop may be left unharvested and permitted to form a mulch.

In orchards, crimson clover often is allowed to mature, then is disked into the soil.

VOLUNTEER STANDS

Varieties of the reseeding type volunteer good stands in the fall year after year if they are properly managed. To insure volunteer stands in pastures, prevent close grazing at the time of blooming; heavy grazing at that stage may limit the quantity of seed produced. If you grow crimson clover with summer-growing perennial grasses such as Johnsongrass or bermudagrass, either clip the pasture in the fall or permit livestock to graze it closely. Removing most

of the vegetation produced during the summer will give the clover a chance to become established. If the turf of summer-growing grasses is exceptionally thick, disk or burn before you notice the crimson clover starts to germinate.

When used in rotation with row crops, crimson clover will volunteer if the seed is allowed to mature in the spring before the seedbed is prepared for the cultivated crop. Good stands have been obtained following sorghum or late-planted corn. They are lacking following cotton or early-planted corn because the soil must be prepared for these crops before clover seed is ripe.

SEED PRODUCTION

Crimson clover produces large seed yields, and the seed is easy to harvest. Yields of 5 to 10 bushels per acre are common. Seed yields usually are higher on soils of medium fertility than on rich soils; fertile soils seem to stimulate vegetative growth rather than develop flower heads.

Florets are self fertile, but not self tripping. Bees, visiting the flowers, increase the number of seeds per head by tripping the florets and transferring pollen. For each acre of clover, place one or two strong colonies of honey bees at the edge of the field at blooming time.

Weed Control in Seed Crops

Crimson clover seed yields are frequently increased when weeds, including volunteer crop plants,

are controlled. Seed quality is also improved by controlling weeds whose seed are difficult to remove from crimson clover seeds.

Some weeds such as dock and sorrel (*Rumex* spp.) and wild onion (*Allium* spp.), whose seed are difficult to separate from crimson clover seed, cannot be selectively controlled in the clover. Thus seed production should not be attempted in fields infested with these weeds.

Winter annual grasses, henbit (*Lamium amplexicaule*), chickweed (*Stellaria* spp.), and volunteer small grains can be controlled by using 4 to 5 pounds per acre of isopropyl carbanilate (propham). Propham should be applied while the weeds are very young and small, but it should not be applied until the crimson clover has at least three leaves. In the Southern States, application of isopropyl *m*-chlorocarbanilate (chlorpropham) at 4 pounds per acre in granular form when the crimson clover has at least four leaves will control these same weeds. It, like propham, will not control the weeds if they are much beyond the early stages of emergence when treated.

In the Pacific Northwest, grasses arising from seed can be controlled in crimson clover seed fields by incorporating 3 to 4 pounds per acre of *S*-ethyl dipropylthiocarbamate (EPTC) in the soil before planting.

Many broadleaf weeds such as wild geranium (*Geranium* spp.), pepperweeds (*Lepidium* spp.), and plants of the genus *Brassica* (mustards, rape, turnips) can be con-



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Figure 3.—A combine with pickup attachment threshing a crimson clover seed crop that dried in the swath.

trolled with [(4-chloro-*o*-tolyl)oxy] acetic acid (MCPA). MCPA should be applied at 0.10 to 0.13 pounds per acre in early spring while both weeds and crimson clover are small. If treatment is delayed until the clover begins rapid upright growth, the weeds will not be controlled, and the crimson clover will be injured.

Grazing Seed Crops

Grazing or clipping during late winter or early spring may slightly reduce seed yields, if spring growing conditions are unfavorable. On the other hand, if some growth is not grazed off and if spring growing conditions are favorable, growth may become so rank that

it will lodge and result in low seed yield or failure.

The crop may as well be grazed in late winter or early spring, since grazing is just as likely to benefit the seed crop as to harm it. Remove animals 4 to 6 weeks before the time you expect the crop to reach full bloom. After the animals are removed, clip—it will result in more uniform flowering and seed ripening.

Harvesting

Hand harvesting may be practical for obtaining small quantities of seed. Mature seed heads shatter readily and are easily stripped by hand or by using a homemade stripper.

Seed may be mechanically harvested in three ways: (1) Combined direct from standing plants; (2) cut with a mower and left in the swath or windrow to dry out, then picked up and threshed with the combine; and (3) cut with a mower and left in the swath or windrow to dry out, then hauled to a stationary huller or thresher (fig. 3).

Letting the crop dry in a swath or windrow permits earlier cutting, which reduces harvest shattering losses. Swathing or windrowing also reduces the risk of seed being shattered by strong winds or rain. To keep shattering at a minimum, cut and windrow when the heads are damp and tough.

Because heads must be dry for direct combining, there is considerable shattering loss with this method of harvesting.

Harvest when most of the hulls are light brown if the seed is stripped or cut with a mower. Wait until the hulls are dark brown for direct combining.

Drying harvested seed usually is necessary in humid areas to lower moisture content to a safe level for storing. Drying may be done with hot-air driers, or seed may be thinly spread under shelter and frequently turned until dry enough to store. Remove trash and weed seed as soon as possible after harvest.

Preharvest defoliation has not been very successful in humid areas. It is successful if the weather is dry at harvesttime.

PRECAUTIONS

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key—out of the reach of children and animals—and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide con-

tainers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations.